

# *Movers of the Economy*

Model of Interactions

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## **Abstract:**

**There are some proposal, at the present time, to follow the performance and successfulness of an economy non by the classical GDP but on a complex of indicators connected with the GNH. To follow, by this way, the quality of life and satisfaction of citizens.**

**But results of the work of the model show this procedure as being incorrect. It would include only internal movers!**

**On the other side it's worth noting that the usage of GNH is in motion in the economy spontaneously. Internal movers, as was shown, implement this criterion without waiting on decisions of some state clerks. Nevertheless, through the education and the general influence on the society in sense of GNH, the government plays an important role enabling to these movers gain a new power.**

*Keywords: Mover, model, impulse, proof.*

## I. INTRODUCTION

Political scientists like to murmur: The democracy is not perfect, we know, but a better mechanism doesn't exist.

Visionary statisticians and politicians speculate about the substitution of the GDP by another, more complex indicator closer to the human happiness and satisfaction.

## II. MODEL OF INTERACTIONS

But the economy itself already invented a better mechanism and a complex indicator, too.

The problem of today is to discover these mechanism and indicator in the economy, to understand them and to sustain, perhaps.

We must use for this goal a model minimally burdened by our present knowledge of the economy. An econometric model is excluded from this reason. A generally acceptable starting and unburdened concept are interactions and a model of interactions.

The result of learning of this model (as a program) is a model (as a reflection of the reality) as a system of interactions describing the economy and usable for the forecast.

The behavior of every object from the reality – its output – is described in any moment as a value of a time series. It's a result of interactions of the object with the environment and with itself in the past – see figure 1.

## III. THE PROOF IN THE ECONOMY

Now, it is possible to search some structure in the system of interactions supplied by the model for the description of the reality.

Let us suppose, we want to discover in this chaos of interactions some particular property. The procedure will be following.

First of all, what we must have to our disposal?

The model of interactions already mentioned will be necessary yet once.

The particular property must be transformable to the language of interactions, to the development of their intensities in the time.

And finally, a criterion judging the truth of the forecast of the model. This criterion is a set of functions evaluating probability of the forecast to be true. The result of this evaluation is a weighted average of values of these functions. In this set there can be for example "econometric" functions, statistical functions, function of comparison with a consensus of experts, function of stability of the forecast in the time (it means the difference between present and previous forecast), various economic identities etc. In general, they are hundreds.

Now, back to the verification of a particular property.

First, we make a forecast with use of the "old" model and by criterion we evaluate the quality of the forecast. In the next step, we incorporate in the model the pursued property, we make a forecast for new and we evaluate it by the criterion. Now, if the value of the criterion is higher, the property is "proved". It means that in the reality, with the probability being a function of this difference of criteria, the pursued property exists.

We must add: This procedure is the more usable the more "quality" is the model and the criterion. But in all cases, it is better than nothing. Better than the today state, when the professional press publishes very professional sounding statements without any proof.

A proof like the instrument of mathematics, holding for 100 pct, doesn't exist, of course. In economics it can be only a function of the present level of knowledge, in contrast with mathematics. But in fact the mathematical proof is only a show of deductive skill on primary suppositions having little in common with the reality.

At the end, we must note: The crucial is the fact of the forecast. Without the forecast, only on the basis of the learning in the past and approaching to this past, we aren't authorized to make any conclusions about the truth. This is no proof!

#### IV. THE STRUCTURE OF THE ECONOMY

Following properties were found – proved - in the time of a study of the Czech economy, using the mentioned mechanism of proof.

1. In all situations, the most probable is the structure of incoming interactions, in what these interactions are the most balanced. We can name it as a trend to the stability.

*On the figure 1 it means: the more probable are structures with inputs to the value  $OR_i$  having a small standard deviation.*

2. There is an agglomeration of interactions to higher entities – events. These are typical for particular time series and that is why also for objects from the reality generating these time series.

3. Events have a specific and a nonspecific part. The nonspecific part exists in every event and describes the general situation of an object. The specific one characterizes changes in relations to the environment, happening during the event.

4. The nonspecific part is started every time by a tension (see further) in interactions, followed by its solution, by an increase of instability (see above) and by its diminution at the end. This is the standard “envelope”, nonspecific accompaniment of all events.

5. The specific part of an event says for example, that in the time of the event there is a fixation of the distance with objects in the environment or that there is in contrast their dynamism, and so on.

6. In a special “chapter” there are interactions coming from the past of the studying object itself. They import the influence on the resulting value not from the environment but from the past of this particular object itself, its “experience”, its “memory”. These interactions are also a part of an event – of its specific part.

*Note:*

*The tension is a property identified by the model in the time of learning. It means that some interaction is in some time found to be different than expected by the model, depending on the state of learning. As being deviated out.*

*But this deviation has its reasons and the model tries to discover them.*

#### V. MOVERS

The study of the structure of the Czech and the US economy showed, that interactions ad 6 are noticeable and play an important role in the economy. Objects described with help of these interactions are due to their functions named movers.

They can be verbally characterized as objects:

1. with an activity been not only a continuation of impulses from the environment, but
2. been, from an important part, a typical one, coming from their own experience, and
3. the environment has an interest for this typical activity and
4. they constitute in this environment impulses for other typical activities.

The model of interactions in the case of a mover (object1) repeatedly identifies these events – see figure 2:

- in the time  $i$  input to the object1 contains:

$o + \text{interaction}(1, 1)$

*(this is an interaction from the object1 in the past to the object1 in the present)*

- in the time  $i+1$  inputs from objects2-N – the environment - contain:

o For  $rg = 2$  To  $N$

o +  $\text{interaction}(rg, rg)$

o Next  $rg$

*(these are interactions from objects2-N in the past to the same objects2-N in the present)*

The model identifies two groups of movers. Outer and inner ones.

Outer movers are **Imports of goods**.

Inner movers are related with the **GNH** – Gross National Happiness.

For the Czech economy we have just now to our disposal only these time series from the group of the GNH.

The group of **Non-Financial sector accounts** been in principle incomes of households,

**Consumption of households** as a part of the GDP and

The group of the **Movement of citizens** (births, abortions, weddings, ...).

#### VI. MOVERS IN THE STRUCTURE OF THE ECONOMY

First results of the model indicate following integration of movers into the structure of the economy.

First of all, the group of external movers is crucial for the functioning of the economy. They import into the structure approx. 80-90% of important impulses. The GNH group will probably increase its importance in time in connection with the growing social accent posed on appropriate indicators – see president Sarkozy and its GNH - and in connection with the growing importance of the

“green” thinking. That is why we can perhaps establish that the social mind, the state of knowledgeability, the conduct to the nature and to the man itself there aren’t anything being anywhere in a human or governmental mind but a real factor exhibiting itself in the real economy.

Impulses from movers (it means output interactions being part of events and provoking typical and important responses in the environment – see definition of movers) enter into the economy throughout several ways.

The first way is the way of the Foreign Trade, which is not influenced by internal movers. Export reacts immediately on impulses from Import and doesn’t influence the course of the economy.

A part of impulses from Import enter into the second way, where they meet with impulses from internal movers. We divide these internal movers into two groups. First of all it’s already mentioned group of Movement of Citizens and of Incomes of Households. They hand over impulses by the same manner as external movers: an impulse comes from an area external to the economy (either from outside in the case of Import or from a lower level in the case of citizens and households – they are by one level lower in comparison with the economy).

The Consumption of Households is a special group. It is characterized by the fact that impulses come not from outside or lower-side of the structure of the economy, but they are actively extracted just from this structure and only after on they enter into the environment by a standard scheme of movers.

The object which forms the Consumption of Households contracts itself in behavior to the environment, its distance diminished and as a result classical impulses from movers output into the environment.

#### VII. WAYS OF IMPULSES FROM MOVERS

Expansion of impulses from external movers on the output of Export can be illustrated on the work of the model. It identifies events – recurrent regularities in interactions – in which:

For Import:

- In time  $i-1$  input of the object1 – of Import - contains:
  - + interaction(1, 1)

(an interaction from the object1 in the past to the object1 in the present)

- In time  $i$  inputs of the objects2-N – environment - contain:
  - For  $rg = 2$  To  $N$ 
    - + interaction( $rg, rg$ )
  - Next  $rg$

(interactions from the objects2-N in the past to the objects2-N in the present )

This is a classical situation of a mover. But interesting is the fact of being followed by an analogous event in Export:

- In time  $i$  inputs of objects2-M – environment - contain:
  - For  $rg = 2$  To  $M$ 
    - + interaction( $rg, rg$ )
  - Next  $rg$
- In time  $i+1$  input of the object1 – Export - contains:
  - + interaction(1, 1)

We can see how an impulse from a mover goes on onto the output from the economy – into Export

Impulses from movers, external and internal, meet them at the end in a common pool – a bus, from which other parts of the economy take impulses for their activities. That is how is established a new level: being atomic, undividable into some elements. This is a formation of a new object. It is an origin of a whole, not being an aggregation of parts.

#### VIII. PARTS OF THE STRUCTURE OF THE ECONOMY

Specific functional parts, after overtaking impulses from the common pool, show specific activities.

□ **SV** – Government Consumption – impulses are changed into the stability of the whole structure.

Particularly it means, that the model of interactions identifies, in the connection with the activities of SV, events with a specific interaction with a specific property: stability, constancy of the distance.

□ **TFK** – Gross Capital Formation – impulses are changed into the dynamics.

That is why TFK is a certain contrast of SV. Time series concerning employment belong to this group, too.

At the end there is an activity concerning the whole economy. These are events connected with the whole GDP. Their construction is the same as that of Export – impulses expand to the environment and this is a mover for the environment. The only difference is in the fact that the interaction is between the whole economy and the environment. There is an impression that the USA activity on this level precedes the Czech one by one year. The meaning and the function of this activity is not yet known.

It is probable, that impulses make the following way: out from the economy to another economy in the environment, particularly to its GNH group. By the output of the whole back to the original economy, namely its GNH.

#### IX. GROSS NATIONAL HAPPINESS (GNH)

There are some proposal, at the present time, to follow the performance and successfulness of an economy non by the classical GDP but on a complex of indicators connected with the GNH. To follow, by this way, the quality of life and satisfaction of citizens.

But results of the work of the model show this procedure as being incorrect. It would include only internal movers!

On the other side it's worth noting that the usage of GNH is in motion in the economy spontaneously. Internal movers, as was shown, implement this criterion without waiting on decisions of some state clerks. Nevertheless, through the education and the general influence on the society in sense of GNH, the government plays an important role enabling to these movers gain a new power.

### X. CONCLUSION

Let us make some notes to the structure found in the economy.

We can ask, what is its meaning, who does organize it? The answer is just in the structure of movers. When anywhere in anytime a structure with a stable input of important and convenient impulses in the form of movers is established, this is a basic prerequisite for its future existence.

In the same time this structure must contain its own mechanisms solving unsatisfaction of its elements.

Results of the work of the model of interactions indicate just this structure in the economy.

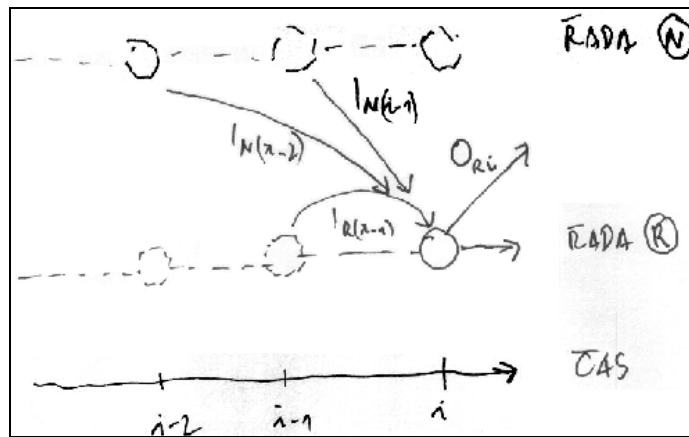


Figure 1. Interactions and the Output Value

Time series (RADA) R in the time  $i$  has a value  $OR_i$  – output. This value is a result of inputs, interactions from preceding times. From the time series N for example inputs are from times  $i-1$  and  $i-2$  and from the time series R itself from the time  $i-1$ .

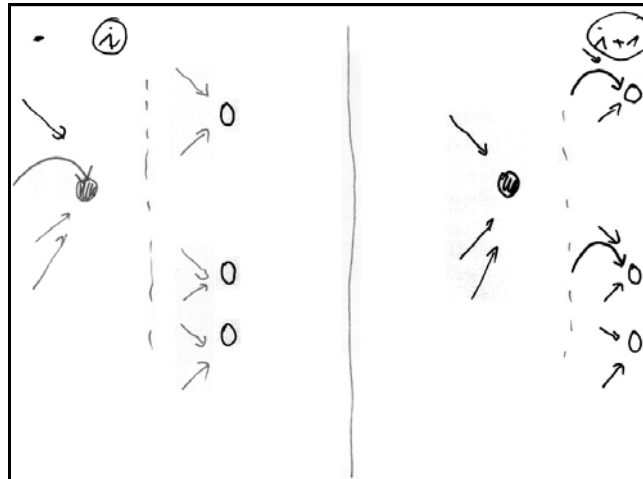


Figure 2. Mover – illustration of the preceding text (arched interactions are inputs from the past of the same object) On the left side of both semi-figures is an object1, on the right side objects2-N. The left semi-figure is in time  $i$ , the right one in time  $i+1$ .

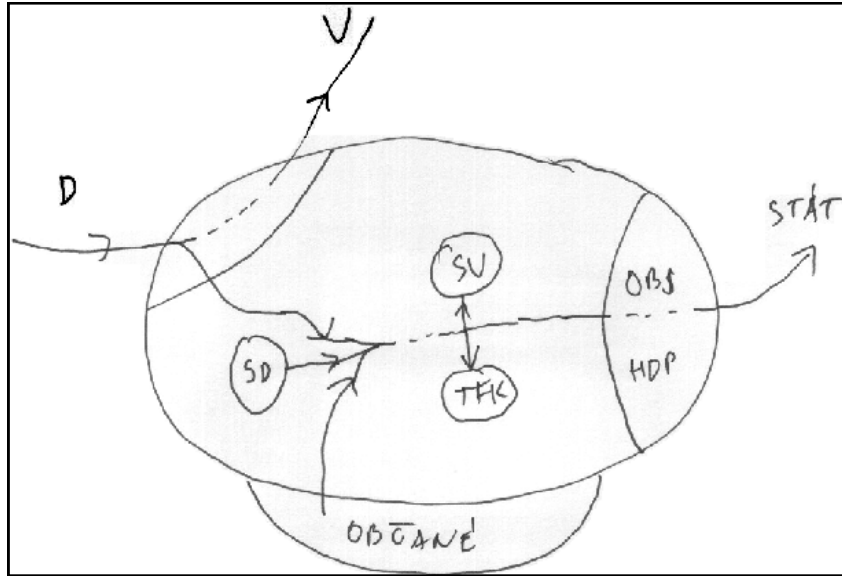


Figure 3. The Structure of the Economy

D is the Import of goods, V Export of goods, SD Consumption of households, SV Government consumption, TFK Fixed capital formation, OBJ is the activity of the economy as whole, characterized by its GDP. This output is an event representing to some extent the state – STÁT – as whole. OBČANÉ is the group of GNH without SD.

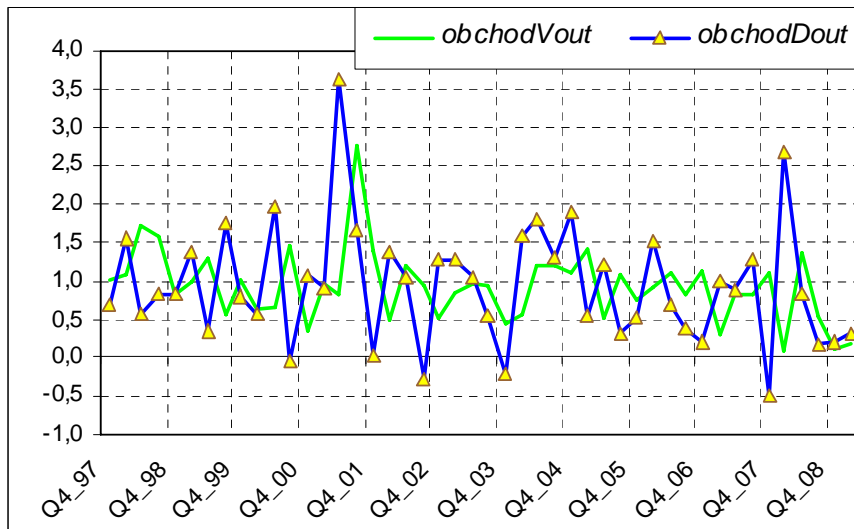


Figure 4. Input and Output of Impulses of Foreign Trade

obchodDout are impulses coming into the economy from Import of Goods as activity of external movers. Their way is straightforward on the Export of Goods, not being influenced by internal structure of the economy. obchodVout are impulses entering into Export from the economy. We can see the smooth shift between impulses from movers and impulses to the Export and that is why the way is straightforward.

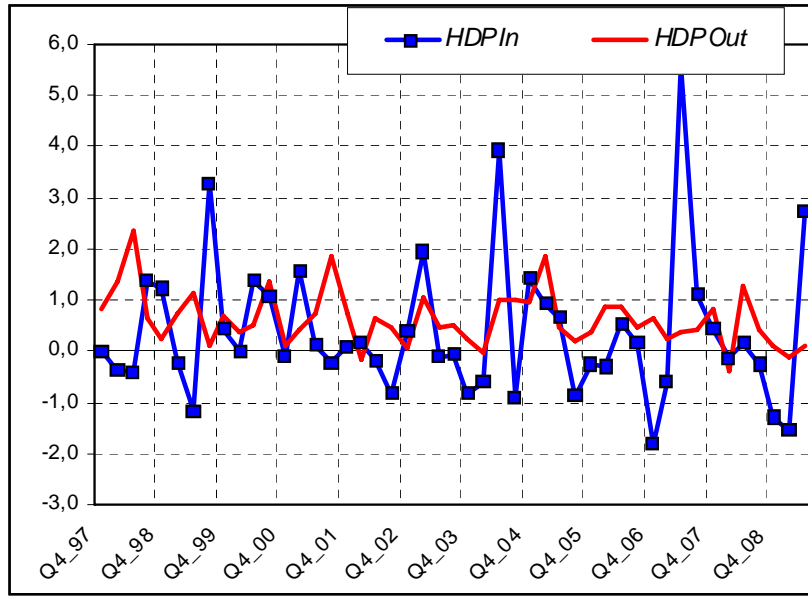


Figure 5. Global Output from the Economy

HDPIIn are impulses to the environment from the GDP event, HDPOut are incoming impulses on the input of this global output – GDP event  
 HDPOut corresponds roughly speaking to the pool of impulses. HDPIIn seems to have important values in the time of commencement and of damping of prosperities of the economy.